

REMARKS

The Final Office Action dated February 19, 2004, has been received and reviewed.

Claims 1-22 are currently pending and under consideration in the above-referenced application. Each of claims 1-22 stands rejected.

Reconsideration of the above-referenced application is respectfully requested.

Rejections Under 35 U.S.C. § 102(e)

Claims 1, 2, 6, 7, and 10-22 stand rejected under 35 U.S.C. § 102(e) for reciting subject matter which is purportedly anticipated by the subject matter disclosed in U.S. Patent 6,461,932 to Wang (hereinafter “Wang”).

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single reference which qualifies as prior art under 35 U.S.C. § 102. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Wang describes a process for creating a trench-isolated semiconductor structure “using a pre-smoothing technique to avoid difficulties such as dishing and premature silicon-nitride removal that might otherwise occur during chemical-mechanical polishing...” (hereinafter “CMP”). Col. 4, lines 48-51. While the avoidance of dishing a premature silicon nitride removal may prevent some of the nonplanarities that might occur during CMP, other types of nonplanarities may remain.

The process of Wang includes providing a dielectric layer 56 over a semiconductor surface, and covering the dielectric layer 56 with a “smoothing layer” 60. Col. 6, lines 23-28. The smoothing layer 60 has an upper smoothing surface 62 which is smoother than the upper dielectric surface 58 of the dielectric layer 56. Col. 6, lines 29-31. The smoothing layer 60 is applied either by a “deposition/spinning procedure” (col. 6, line 52, to col.7, line 14), a

“deposition/flow” procedure (col. 7, lines 15-27), or a combination of these procedures (col. 7, lines 28-41).

Although Fig. 4d of Wang illustrates the upper smoothening surface 62 of the smoothening layer 60 as being planar, M.P.E.P. § 2125 provides that “[d]rawings and pictures can anticipate claims is they clearly show the structure which is claimed,” but cautions that the “drawings must be evaluated for what they reasonably disclose and suggest to one of ordinary skill in the art.” This rule is based, at least in part, upon the holding in *In re Aslanian*, 200 USPQ 500 (C.C.P.A. 1979), in which the court directed “[w]e evaluate and apply the teachings of all relevant references on the basis of what they reasonably disclose and suggested to one skilled in the art . . .” In *Aslanian*, the court was evaluating the relevance of drawings of a design patent as prior art to the claims of a patent application. Relative dimensions were not at issue, indicating that the guidance provided by M.P.E.P. § 2125 merely discusses relative dimensions of features of an illustrated object as an example of something that may not be reasonably disclosed or suggested to one of ordinary skill in the art.

M.P.E.P. § 2125 also requires that arguments about illustrated drawing features, such as proportions and dimensions (*e.g.*, planarity or nonplanarity), are of little value when the specification does not indicate that the drawings may be relied upon for such a purpose. Neither the M.P.E.P. nor the relevant case law indicates, however, that an omission means that the subject matter illustrated in drawings must be taken at face value, as has been asserted at page 9 of the Final Office Action.

In fact, Wang clearly acknowledges that the upper smoothening surface 62 of the smoothening layer 60 is merely “largely planar,” noting that the term “largely planar” is a relative term, merely comparing the planarity of the upper smoothening surface 62 to the highly nonplanar upper dielectric surface 58. Col. 6, lines 35-36. Further, Wang clearly explains that “slight depressions [are present] in upper smoothening surface 62 at locations of the deepest parts of the depressed portion of upper dielectric surface 58.” Col. 6, lines 32-37.

Once the smoothening layer 60 has been formed, the smoothening layer 60 and the dielectric layer 56 are removed by CMP methods until a portion of the underlying semiconductor device is exposed. Col. 7, line 42, to col. 8, line 25.

Independent claim 1, as proposed to be amended, is directed to a method for preparing a surface of a semiconductor device structure for planarization. The method of amended independent claim 1 includes, among other things, spreading a second material over a first material layer having a nonplanar surface so as to form a second material layer having a planar surface.

Wang lacks any express or inherent description of spreading a second material layer over a first material layer so as to form a second material layer having a planar surface, as recited in amended independent claim 1. Instead, Wang describes a smoothening layer 60 that may include “slight depressions” in the upper smoothening surface 62 thereof. Col. 6, lines 32-34.

Accordingly, it is respectfully submitted that Wang does not anticipate each and every element of amended independent claim 1, as would be required to maintain the 35 U.S.C. § 102(e) rejection of amended independent claim 1. It is, therefore, respectfully submitted that, under 35 U.S.C. § 102(e), amended independent claim 1 recites subject matter which is allowable over that described in Wang.

It is also respectfully submitted that claims 2, 6, 7, and 10-22 are each allowable, among other reasons, for depending either directly or indirectly from claim 1, which is allowable.

Claim 2 is additionally allowable because Wang lacks any express or inherent description that the smoothing layer 60 thereof comprises a stress buffer material. As explained at paragraph [0018] of the specification of the above-referenced application, a stress buffer material may “facilitate[] planarization . . . without causing substantial defects” in an underlying material layer. Wang lacks any express or inherent description that the smoothing layer 60 thereof facilitates planarization. Rather, the description of Wang is limited to a disclosure that the smoothing layer 60 prevents the formation of depressions in trench dielectric regions (“dishing”) and/or the undesired removal of material underlying the dielectric material in the semiconductor structure, such as nitride or oxide layers, during CMP. Col. 2, lines 9-27.

Claim 10, which depends from claim 2, is further allowable since Wang does not expressly or inherently describe that the smoothing layer 60 may be spread such that one valley of the underlying dielectric layer 56 may be at least partially filled while at least one peak of the underlying dielectric layer 56 may remain substantially uncovered. Instead, the description of Wang is quite clearly limited to applying the smoothing layer 60 in such a manner that “the depressed portion[s] of upper dielectric surface 58 above trench[es] 54” are completely filled. Col. 6, lines 26-27; Fig. 4d. None of the peaks of the dielectric layer 56 is exposed until after the CMP process has begun. *See* col. 7, line 65, to col. 8, line 4.

Claim 13, which depends from claims 2, 10, 11, and 12, is additionally allowable since Wang includes no express or inherent description that the dielectric layer 56 may be *etched* with selectivity over the smoothing layer 60 thereof until a surface of at least one region of the dielectric layer 56 is in substantially the same plane as a surface of the smoothing layer 60. Instead, the dielectric layer 56 of Wang is not removed until after CMP of the smoothing layer 60 exposes it through the smoothing layer 60. Even then, it is through removal of the smoothing layer 60 by CMP that surfaces of the smoothing layer 60 and the dielectric layer 56 are made substantially coplanar. *See* col. 7, line 65, to col. 8, line 4; Fig. 4e.

Claim 15, which depends from claims 2, 10, 11, 12, and 13, is additionally allowable since Wang includes no express or inherent description that the dielectric layer 56 and the smoothing layer 60 may be etched at substantially the same rate so as to expose a surface of the mask layer 44 adjacent a surface of a portion of the dielectric layer 56 in at least one recess, with the surfaces of the mask layer 44 and the dielectric layer 56 being located in substantially the same plane following such planarization. Rather than describing etching processes to remove both the smoothing layer 60 and the dielectric layer 56, the description of Wang is limited to use of CMP.

In view of the foregoing, it is respectfully requested that the 35 U.S.C. § 102(e) rejections of claims 1, 2, 6, 7, and 10-22 be withdrawn.

Rejections Under 35 U.S.C. § 103(a)

Claims 3, 4, 5, 8, and 9 stand rejected under 35 U.S.C. § 103(a).

The standard for establishing and maintaining a rejection under 35 U.S.C. § 103(a) is set forth in M.P.E.P. § 706.02(j), which provides:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Wang in View of Yoshihara

Claims 3-5 have been rejected under 35 U.S.C. § 103(a) for being directed to subject matter which is allegedly unpatentable over the subject matter taught in Wang, in view of teachings from U.S. Patent 6,117,486 to Yoshihara (hereinafter "Yoshihara").

Claims 3-5 are each allowable, among other reasons, for depending either directly or indirectly from claim 1, which is allowable.

Moreover, it is respectfully submitted that the Office has not established a *prima facie* case of obviousness against any of claims 3-5, as would be required to maintain the 35 U.S.C. § 103(a) rejections of these claims.

The teachings of Wang have been summarized above.

Yoshihara teaches a method for forming photoresist layers that have a "predetermined" "uniform thickness" without any "ripples" therein. *See, e.g.*, Col. 2, ln. 33; Col. 11, ln. 48-54, 62; Fig. 9.

It is respectfully submitted that one of ordinary skill in the art would not have been motivated to combine the teachings of Wang with those of Yoshihara. In particular, if the process taught in Yoshihara were used to form the smoothening layer 60 of Wang, the smoothening layer

would have a uniform thickness. As a result, the smoothening layer 60 would be as nonplanar as the underlying dielectric layer 56. Therefore, it appears that any motivation to combine the teachings of Yoshihara and Wang in the manner that has been asserted could only have been improperly gleaned from the subject matter described in the above-referenced application.

Moreover, it is respectfully submitted that a person of ordinary skill in the art at the time of the invention would have no reason to believe that combining the teachings of Wang and Yoshihara in the manner that has been asserted would have been successful. Again, use of the spin-on process taught in Yoshihara to form the smoothening layer 60 of Wang would have merely resulted in a structure with nonplanar smoothening layer 60 of substantially uniform thickness, not in a material layer that has a planar surface, as required by independent claim 1, from which claims 3-5 depend.

For these reasons, it is respectfully submitted that, under 35 U.S.C. § 103(a) each of claims 3-5 is allowable over Wang and Yoshihara, taken either individually or together.

Wang in View of Hsieh

Claims 8 and 9 stand rejected under 35 U.S.C. § 103(a) for reciting subject matter which is assertedly unpatentable over the teachings of Wang, in view of teachings from U.S. Patent 6,228,711 to Hsieh.

Claims 8 and 9 are both allowable, among other reasons, as respectively depending directly and indirectly from claim 1, which is allowable.

In view of the foregoing, it is respectfully requested that the 35 U.S.C. § 103(a) rejections of claims 3-5, 8, and 9 be withdrawn.

Entry of Amendments

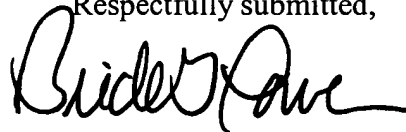
It is respectfully requested that the proposed claim amendments be entered. The proposed amendments do not introduce new matter into the application, nor would they require an additional search. Moreover, it is respectfully submitted that the proposed amendment to independent claim 1 reduces that number of issues that remain for appeal.

In the event that a decision is made not to enter the proposed claim amendments, entry thereof upon the filing of a Notice of Appeal in the above-referenced application is respectfully requested.

CONCLUSION

It is respectfully submitted that each of claims 1-22 is allowable. An early notice of the allowability of each of these claims is respectfully solicited, as is an indication that the above-referenced application has been passed for issuance. If any issues preventing allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully submitted,



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